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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/582,333	10/23/2006	Flora Tak Tak Ng	28870/38753	4911

4743 7590 04/29/2009

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EXAMINER	
WANG, XIAOBEI	
ART UNIT	PAPER NUMBER
1793	

MAIL DATE	DELIVERY MODE
04/29/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/582,333	NG ET AL.	
	Examiner	Art Unit	
	XIAOBEI WANG	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 March 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *17-23,30-34,36-40 and 48-75* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *17-23,30-34,36-40 and 48-75* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/22/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status Report

The restriction requirement filed is rendered moot in view of amendments filed Feb 18, 2009, and is therefore withdrawn. Claims 1-16, 24-29, 35, and 41-47 are cancelled, with claims 17-23, 30-34, 36-40, and 48-75 pending and presented for examination.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 17-23, 30-34, 36-40, 48-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gao et al (US Patent 6,291,719) in view of Mertzweiller (US Patent 3,562,351).

Regarding claim 17, Gao teaches the use of a catalytic composite featuring a support structure made of alumina and a Group VIII metal as the catalytically active material (column 7, lines 7-10) in a catalytic distillation process (column 1, lines 16-18). Gao discloses the use of conventionally shaped catalysts such as Raschig rings, saddle shapes, spheres, and cylinders (column 2, lines 55-59). From the examples illustrated in Tables 1-5 of Gao, the surface area of these catalyst composites ranges from about 25 to 600 m^2/g (columns 9-11). Gao also teaches that the catatlyst support structures have a void fraction between 20 to 70% (column 6, lines 1-4), and that the Group VIII metal used as the catalytically active species is present in a range

between 0.01-1% (column 13, lines 29-31). These are prima facie cases of obviousness given that the ranges taught by Gao overlap with the instantly claimed ranges (see MPEP 2144.05 I).

While Gao does not expressly teach the use of the taught catalyst in a selective dimerization reaction of lower alkenes to a C_6-C_{12} alkene, Mertzweiller teaches the use of a Group VIII metal on a non-zeolite support structure (column 1, lines 12-5) in a dimerization of propylene and butene to reaction products ranging from C_6 to C_{12} (column 1, lines 47-55). Since both Mertzweiller and Gao both teach catalysts made from Group VIII metals on a non-zeolite support structure, the catalyst of Gao is functionally equivalent to the catalyst disclosed in Mertzweiller and thus, is capable of carrying out the same reaction. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use a functionally equivalent catalyst, such as that taught by Gao, in the process taught by Mertzweiller.

Regarding claims 18, 22, and 23, Mertzweiller teaches the dimerization of butenes to various octene isomers (column 1, lines 56-63).

Regarding claim 19-20, Gao teaches packing the catalyst composite with stainless steel (which is inert) packings wherein the amount of packings versus the amount of catalytic composite is dependent on the requirement of the given reaction process. Thus, the ratio of inert packings to catalytic composite is a result-effective variable and one of ordinary skill in the art would be motivated to find the optimal ratio for carrying out the desired reaction (column 8, lines 45-54).

Regarding claim 21, Gao teaches packing the catalytic composite into the middle part of the catalytic distillation column between the inert packings (columns 8-9, lines 57-6).

Regarding claims 30, Gao teaches the use of a catalytic composite featuring a support structure made of alumina and a Group VIII metal as the catalytically active material (column 7, lines 7-10) in a catalytic distillation process (column 1, lines 16-18). Gao discloses the use of conventionally shaped catalysts such as Raschig rings, saddle shapes, spheres, and cylinders (column 2, lines 55-59). From the examples illustrated in Tables 1-5 of Gao, the surface area of these catalyst composites ranges from about 25 to 600 m^2/g (columns 9-11). Gao also teaches that the catatlyst support structures have a void fraction between 20 to 70% (column 6, lines 1-4), and that the Group VIII metal used as the catalytically active species is present in a range between 0.01-1% (column 13, lines 29-31). These are prima facie cases of obviousness given that the ranges taught by Gao overlap with the instantly claimed ranges (see MPEP 2144.05 I).

While Gao does not expressly teach the use of the taught catalyst in a process making high octane compounds, Mertzweiller teaches the use of a Group VIII metal on a non-zeolite support structure (column 1, lines 12-5) in a dimerization of propylene and butene to reaction products ranging from C_6 to C_{12} (column 1, lines 47-55). Mertzweiller also teaches that the catalyst can be used to hydrogenate alkenes (column 3, lines 33-46). Since both Mertzweiller and Gao both teach catalysts made from Group VIII metals on a non-zeolite support structure, the catalyst of Gao is functionally equivalent to the catalyst disclosed in Mertzweiller and thus, is capable of carrying out the same reaction. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use a functionally equivalent catalyst, such as that taught by Gao, in the process taught by Mertzweiller.

Regarding claims 31-32, the number of columns used in a distillation process affects the efficiency and energy load of the overall process. As such, one of ordinary skill in the art would

seek to find an optimal balance between these parameters and design a catalytic distillation process using the desired number of columns (see MPEP 2144.05 II).

Regarding claims 33 and 34, Mertzweiller teaches the dimerization of butenes to various octene isomers (column 1, lines 56-63).

Regarding claim 36, Gao teaches the use of a catalytic composite featuring a support structure made of alumina and a Group VIII metal as the catalytically active material (column 7, lines 7-10) in a catalytic distillation process (column 1, lines 16-18). Gao discloses the use of conventionally shaped catalysts such as Raschig rings, saddle shapes, spheres, and cylinders (column 2, lines 55-59). From the examples illustrated in Tables 1-5 of Gao, the surface area of these catalyst composites ranges from about 25 to 600 m^2/g (columns 9-11). Gao also teaches that the catatlyst support structures have a void fraction between 20 to 70% (column 6, lines 1-4), and that the Group VIII metal used as the catalytically active species is present in a range between 0.01-1% (column 13, lines 29-31). These are prima facie cases of obviousness given that the ranges taught by Gao overlap with the instantly claimed ranges (see MPEP 2144.05 I).

While Gao does not expressly teach the use of the taught catalyst in a process to make C_6-C_{18} alkenes, Mertzweiller teaches the use of a Group VIII metal on a non-zeolite support structure (column 1, lines 12-5) in a dimerization of propylene and butene to reaction products ranging from C_6 to C_{12} (column 1, lines 47-55). Since both Mertzweiller and Gao both teach catalysts made from Group VIII metals on a non-zeolite support structure, the catalyst of Gao is functionally equivalent to the catalyst disclosed in Mertzweiller and thus, is capable of carrying out the same reaction. Therefore, it would have been obvious to one of ordinary skill in the art at

the time of invention to use a functionally equivalent catalyst, such as that taught by Gao, in the process taught by Mertzweiller.

Regarding claims 37-38, a distillation column will inherently characterize a temperature gradient, and as a result, alkenes will tend to congregate in specific zones within the distillation column as a result of their boiling points. Therefore, one skilled in the art would envisage different alkenes to be predominantly located in specific regions of the distillation column, and undergo reaction there. Furthermore, the number of columns used in a distillation process affects the efficiency and energy load of the overall process. As such, one of ordinary skill in the art would seek to find an optimal balance between these parameters and design a catalytic distillation process using the desired number of columns (see MPEP 2144.05 II).

Regarding claim 39, Mertzweiller teaches that the alkene reagents are butenes (column 1, lines 47-51).

Regarding claim 40, Gao teaches the use of a catalytic composite featuring a support structure made of alumina and a Group VIII metal as the catalytically active material (column 7, lines 7-10) in a catalytic distillation process (column 1, lines 16-18). Gao discloses the use of conventionally shaped catalysts such as Raschig rings, saddle shapes, spheres, and cylinders (column 2, lines 55-59). From the examples illustrated in Tables 1-5 of Gao, the surface area of these catalyst composites ranges from about 25 to 600 m^2/g (columns 9-11). Gao also teaches that the catatlyst support structures have a void fraction between 20 to 70% (column 6, lines 1-4), and that the Group VIII metal used as the catalytically active species is present in a range between 0.01-1% (column 13, lines 29-31). These are prima facie cases of obviousness given that the ranges taught by Gao overlap with the instantly claimed ranges (see MPEP 2144.05 I).

While Gao does not expressly teach the use of the taught catalyst in a selective dimerization reaction of lower alkenes to a C_6-C_{12} alkene, Mertzweiller teaches the use of a Group VIII metal on a non-zeolite support structure (column 1, lines 12-5) in a dimerization of propylene and butene to reaction products ranging from C_6 to C_{12} (column 1, lines 47-55). Since both Mertzweiller and Gao both teach catalysts made from Group VIII metals on a non-zeolite support structure, the catalyst of Gao is functionally equivalent to the catalyst disclosed in Mertzweiller and thus, is capable of carrying out the same reaction. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use a functionally equivalent catalyst, such as that taught by Gao, in the process taught by Mertzweiller.

Regarding claim 48, 55, 62, and 69, Gao teaches that the catalyst support can be alumina (column 7, lines 8-10).

Regarding claim 49, 56, 63, and 70, Gao discloses that the support structure is commonly a Raschig ring (column 2, lines 34-37).

Regarding claims 50-51, 57-58, 64-65, and 71-72, Gao teaches that the catalytic species is a group VIII metal salt, such as palladium, (column 7, lines 56-64). Mertzweiller teaches that the catalytic species is nickel (column 4, lines 7-26).

Regarding claim 52, 59, 66, and 73, Mertzweiller teaches that the catalytic species can nickel chloride or nickel sulfate (column 4, column 15-17).

Regarding claim 53, 60, 67, and 74, Gao teaches using a mixture of ammonium and sulfate to bind the metal salt containing the catalytic species (columns 7-8, lines 65-11).

Regarding claim 54, 61, 68, and 75, Gao teaches that the catalytically active species does not have a valence state (columns 7-8, lines 34-11). Mertzweiller also teaches that a ligand is

used to bind the catalyst to the support, wherein the catalyst is an organometallic compound (column 1, lines 13-25). Organometallic compounds contain carbon and hydrogen by definition.

Conclusion

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to XIAOBEI WANG whose telephone number is (571)270-5764. The examiner can normally be reached on Monday - Friday, 8:00am - 5:00 pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art Unit 1793

/X. W./
Examiner, Art Unit 1793